

WE CLAIM:

1. A method of selecting a material for use as the expansive element in a thermoelastic design by deriving an indicator of the material's potential effectiveness for that use, said method including the step of calculating a dimensionless constant $\epsilon\gamma$ for that material in accordance with the formula:

$$\epsilon\gamma = \frac{E\gamma^2 T}{\rho C}$$

wherein E is the Young's modulus of the material; γ is the coefficient of thermal expansion; T is the maximum operating temperature, ρ is the density and C is the specific heat capacity.

2. The method of Claim 1 further including the step of normalising the dimensionless constant relative to that of silicon to a value ϵ which is achieved by deriving the value $\epsilon\gamma$ for the material of interest at the relevant temperature value and dividing this by the value of ϵ obtained for silicon at that same temperature.

3. The method of Claim 1 further including the step of eliminating certain materials by requiring a pre-determined resistivity range.

4. The method of Claim 3 further wherein the resistivity range is between $0.1\mu\Omega\text{m}$ and $10.0\mu\Omega\text{m}$.

5. An expansive element in a thermoelastic design that is made from any functionally suitable material or combinations of materials selected from a group including: silicides and carbides of titanium.

6. An expansive element according to Claim 5 further including one or more of the following properties:

- (e) a resistivity between $0.1\mu\Omega\text{m}$ and $10.0\mu\Omega\text{m}$;
- (f) chemically inert in air;
- (g) chemically inert in the chosen ink; and
- (h) depositable by CVD, sputtering or other thin film deposition technique.

7. An expansive element in a thermoelastic design that is made from any functionally suitable material or combinations of materials selected from a group including:
borides, silicides, carbides and nitrides of tantalum, molybdenum, niobium, chromium,
5 tungsten, vanadium, and zirconium.
8. An expansive element according to Claim 7 further including one or more of the following properties:
- (i) a resistivity between $0.1\mu\Omega\text{m}$ and $10.0\mu\Omega\text{m}$;
 - 10 (j) chemically inert in air;
 - (k) chemically inert in the chosen ink; and
 - (l) depositable by CVD, sputtering or other thin film deposition technique.
9. An expansive element in a thermoelastic design that is made from any functionally suitable alloy material or combinations of alloy materials selected from the group including:
15 borides, silicides, carbides and nitrides of titanium, tantalum, molybdenum, niobium, chromium, tungsten, vanadium, and zirconium.
10. An expansive element according to Claim 9 further including one or more of the following properties:
- 20 (m) a resistivity between $0.1\mu\Omega\text{m}$ and $10.0\mu\Omega\text{m}$;
 - (n) chemically inert in air;
 - (o) chemically inert in the chosen ink; and
 - (p) depositable by CVD, sputtering or other thin film deposition technique.

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